Abstract

Pollution that is created by the textile dyeing industry attracts attention because an effluent containing toxic compounds is released with discharged water. To reduce the amount of residual dye in any effluent, we adopt a different strategy, like a change in dyeing conditions. It is one of the approaches to reducing the environmental impact. However, in this way, we cannot eliminate colored compounds, so for this purpose, we need to adopt the post-dyeing wastewater treatment method so can eliminate remaining toxic compounds before being discharged into water bodies.

In the present research, we investigated the synthesis & characterization of silver nanoparticles, strontium nanoparticles, and silver-strontium bimetallic nanoparticles and their application in the photodegradation of organic compounds such as methylene blue & methyl orange. These nanoparticles were synthesized using the green synthesis method in which pomegranate peel extract was used as a capping and reducing agent. Green synthesis method is eco-friendly and low cost, but it takes longer than the chemical method. The detail characterizations were carried out using Fourier Transform Induced Spectroscopy and Ultra Violet/Visible Spectroscopy technique. UV data analysis of silver nanoparticles shows an absorption peak at 464nm, while strontium nanoparticles show an absorption peak at 224nm. One of the primary aims of this thesis is to test whether monometallic nanoparticles show good degradation efficiency or bimetallic. Silver and strontium were used at different concentrations as silver nanoparticles, strontium nanoparticles & silver strontium bimetallic nanoparticles for degrading dyes. Silver shows good catalytic efficiency, but we want to know the catalytic efficiency of silver with strontium. Heterogeneous bimetallic sometimes increase the catalytic efficiency or sometimes inhibit the catalytic efficiency of the previous one. However, in the present case, bimetallic nanoparticles behave as good catalysts. In the first half of the thesis, the main concern with establishing experimental conditions to monitor photodegradation via UV/Visible spectroscopy. We examined the effects of concentration and exposure in light vs. in the dark. The second half of this study is that bimetallic nanoparticle photodegradation is most efficient than monometallic or purely chemical catalytic degradation.

Keywords: Nanoparticles, silver, strontium, methylene blue, methyl orange, and Ultra Violet/ Visible Spectroscopy.